

# High-Strength, Wear-Resistant Nanocomposite Al-Base Alloys by Rapid Solidification Processing

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High-strength and wear-resistant alloys are required in many engineering applications. An efficient way of producing these is either by nanostructure processing or via rapid solidification processing (cooling of melts at rates  $>10^4$  K/s), which produces fine-grained alloys, supersaturated solid solutions and amorphous alloys. Annealing these metastable alloys formed nanocomposites consisting of a fine dispersion of intermetallic phases either in a solid solution or an amorphous matrix. Consolidation by hot extrusion retained the nanostructure in these alloys. The strength and wear resistance of these alloys increased significantly in comparison to the conventional Al alloys. This has been convincingly demonstrated in Al-Ni-Mm (Mm=misch metal) and Al-Si, Al-Si-Fe, and other Al-based alloys.

